No: ECE 3300

Title: Introduction to Electrical Circuits

Credits: 4 (Lecture plus Lab)

WSU Catalog Description: Prereq: PHY 2185; Co-requisite: MAT 2150.

Instructors: Mark Ming-Cheng Cheng, Assistant Professor of ECE
             Gopakumar “Gopa” Kamalakshakurup, Graduate Teaching Assistant of ECE
             Peng Zeng, Graduate Teaching Assistant of ECE

Office Hours: M 6-8 pm and W 6-8 pm or by appointment (Cheng)

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Course Meeting Time: 8:00PM - 9:20PM, Mon and Wed

Course Meeting Location: 0263 MANO

Lab Meeting Location and Time: 3350 COE
                               3:30-6:20pm Tuesday (Kamalakshakurup)
                               3:30-6:20pm Thursday (Zeng)


Course Structure: We will cover Chapters 1 to 9. There will be homework and reading assignments for each chapter, which are available in the handout. Homework assignments should be completed independently. Some test problems will be adapted from homework assignments.

All exams will be closed-book exams (No notes or cheat-sheets)

Computer Resources: The course can be best learned using computer software Multisim™ and MathCAD™. Multisim is available in the ECE3310 Lab while MathCAD can be accessed in the Engineering PC Lab on the second floor of the Engineering Building (Room 2355).
Grading Weights:

**Lab and Lab Reports** 25%

- Midterm Exam: 100 points
- Midterm Exam: 100 points
- Quiz: 10-20 points (multiple)
- Final Exam: 200 points
- Study Group & Attendance (bonus up to 40 points)

**Note:** If you fail this class, you need to re-take both the lab and lecture.

**In each of the exams, there will be a problem or problems related to the lab experiments.**

Grading Scale:

A = 94-100, A- = 90-93, B+ = 86-89, B = 82-85, B- = 78-81, C+ = 74-77, C = 70-73, C- = 66-69, D+ = 64-65, D = 62-63, D- = 59-61, F = 58 or below

**Goals:** To develop competence in the analysis of electrical circuits and gain limited design experience with relatively simple electrical circuits.

**Learning Objectives:** At the end of this course, students will be able to:

1. Explain and analyze the voltage / current relationships and operational characteristics of resistors, inductors, capacitors, ideal switches, operational amplifiers, and voltage and current sources.

2. Explain and analyze different electrical circuit morphologies. In particular; series and parallel circuit structures, equivalent circuit configurations arrived at by the combination of series and parallel circuit elements such as resistors, inductors, capacitors, current and voltage sources, equivalent circuit configurations arrived at using network theorems such as; Thevenin and Norton equivalent circuits, superposition, and source transformations.

3. Explain and analyze power and energy dissipation and distribution for DC steady state circuits composed of the elements listed in the first objective.

4. Analyze the transient and steady state conditions for electrical circuits using Ohm’s law and Kirchoff’s Voltage and Current laws for DC sources.

5. Design simple electrical circuits, with DC sources, that satisfy specific functional requirements.

6. Use Multisim and/or MathCAD for circuit analysis and design.

**Outcome Coverage**

(a) An ability to apply math, science and engineering knowledge. The course homework and exams require direct application of mathematical, scientific, and engineering knowledge to successfully complete the course. This requires performing various linear
circuit analysis methods in a formal manner and many supporting and follow-up calculations.

(b) An ability to design and conduct experiments, as well as to analyze and interpret data. Students conduct simple circuit analysis using Multisim and/or MathCAD software.

(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such equipment, cost, function, power, control and monitoring. This outcome is a minor component of the course, but nevertheless present. Students will be required to design simple circuits that conform to specific functional specifications.

(d) Identify, formulate and solve engineering problems. The course is primarily oriented toward electrical circuit analysis but also includes examples of where linear circuit theory can be applied to other physical domains to model system performance. Students will be able to identify the system, formulate a circuit model, and solve the circuit model to determine circuit variables in circuits.

(e) The broad education necessary to understand the impact of engineering solutions in a professional world of electrical engineering field. Students taking the course will realize the broad applicability of linear circuit analysis methods to electrical engineering field.

(f) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. Students will use computer simulation and modeling software Multisim and/or MathCAD.

Attendance:
A student is expected to attend all lectures. An Attendance Sheet will be required to be signed by every student in every lecture. Active class participation is expected of all students and may help to boost up the course grade in those "borderline" cases between failing and passing.

It is the student's responsibility to learn the course material. When classes are missed, for whatever reason, it is the obligation of the students to obtain copies of the class materials and students are responsible for all materials covered in the lectures. An excused absence does not excuse the student from completing assigned work, including exams.

Schedule: All students must take the exams on the scheduled dates. No make-up examination will be allowed. Special and legitimate circumstances (e.g., family emergency) will be considered but the instructor should be notified as early as possible.

Accommodations for Students with Disabilities: If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible
community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

**Cheating Policy and Penalty for Cheating:** It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Thus, a student should not falsely claim the work of another as his/her own, or misrepresent him/herself so that the measures of his/her academic performance do not reflect his/her own work or personal knowledge. In this regard, cheating will not be tolerated. Cheating includes (but is not limited to) any communication (written or oral, active or passive) during examinations and sharing of work, such as using the same models or computer programs or copying work. All homework and projects must be an individual effort unless specifically noted. **STUDENTS WHO CHEAT ON ANY ASSIGNMENT OR DURING ANY EXAMINATION WILL BE ASSIGNED A FAILING GRADE (i.e., F) FOR THE COURSE.** Students who witness cheating should report the incident to the instructor as soon as possible (your identity will be strictly protected).

*Note:* The WSU policy is that an *incomplete* grade can only be assigned if:

1. A student is passing the class based on the other material that has been submitted.
2. The work can be completed without attending the class in a future semester.

**Prepared By:** Mark Cheng, Assistant Professor of Electrical and Computer Engineering

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